

Vapor Lock™ 40/40

Corrosion Inhibiting Admixture
ASTM C494 Type S Admixture

Product Description

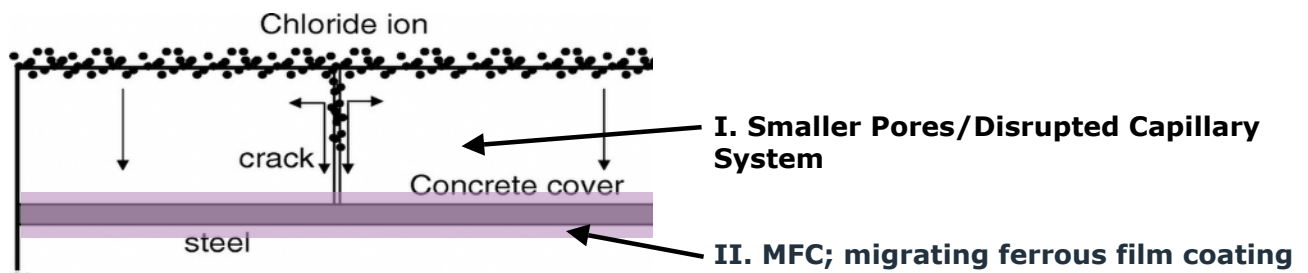
Vapor Lock 40/40 is a liquid admixture designed to provide a permanent capillary break that greatly reduces the permeability in concrete. It is a complex aqueous solution that reacts with the calcium hydroxide present from cement hydration and the extra mix water (not needed for hydration) creating relatively large amounts of additional c-s-h gel. This extra c-s-h disrupts the formation of a developed capillary system and provides for a slower, controlled "internal cure" that allows for greater and more thorough cement hydration. Vapor Lock 40/40 contains a second element (**Migrating Film Coating**), a robust, migrating, electro-chemical film that encapsulates all ferrous material (i.e. rebar, p/t cables, etc.). It is clear in appearance and weighs approximately 9.8 lbs./gallon.

Product Advantages

- Produces a concrete with an Ultra Low Permeability (warranted to be less than 0.174 US Perms) that does not allow for the movement of water or moisture/vapor through the concrete.
- By greatly reducing the egress/ingress of water and moisture, and thus all deleterious elements from entering the matrix, Vapor Lock provides for a denser, more *Durable* restrained piece of concrete.
- Because of greater hydration and more developed cement particle structure with Vapor Lock, it produces concrete with significantly less Long-Term drying shrinkage, in either plain or restrained concrete. Slab curl, warping and ASR are also greatly reduced.
- Can be classified as both a Waterproofing admixture/agent and Non-Accelerating Corrosion Inhibiting admixture.
- Vapor Lock is 'set neutral'; it does not accelerate nor retard the mix, and does not add harsh, reactive chemicals to the mix. Compressive strength is **not** lowered.

Product Uses

Vapor Lock 40/40 corrosion inhibiting admixture is considered a "mixed" inhibitor; both cathodic (the disrupted capillary system) and anodic (migrating ferrous film coating) protection. ***It is the only commercially available admixture that inhibits steel corrosion in concrete two ways; I. by delaying the Initiation Period (the start of corrosion) and II. the Propagation Period of corrosion continuing significant and debilitating damage.***



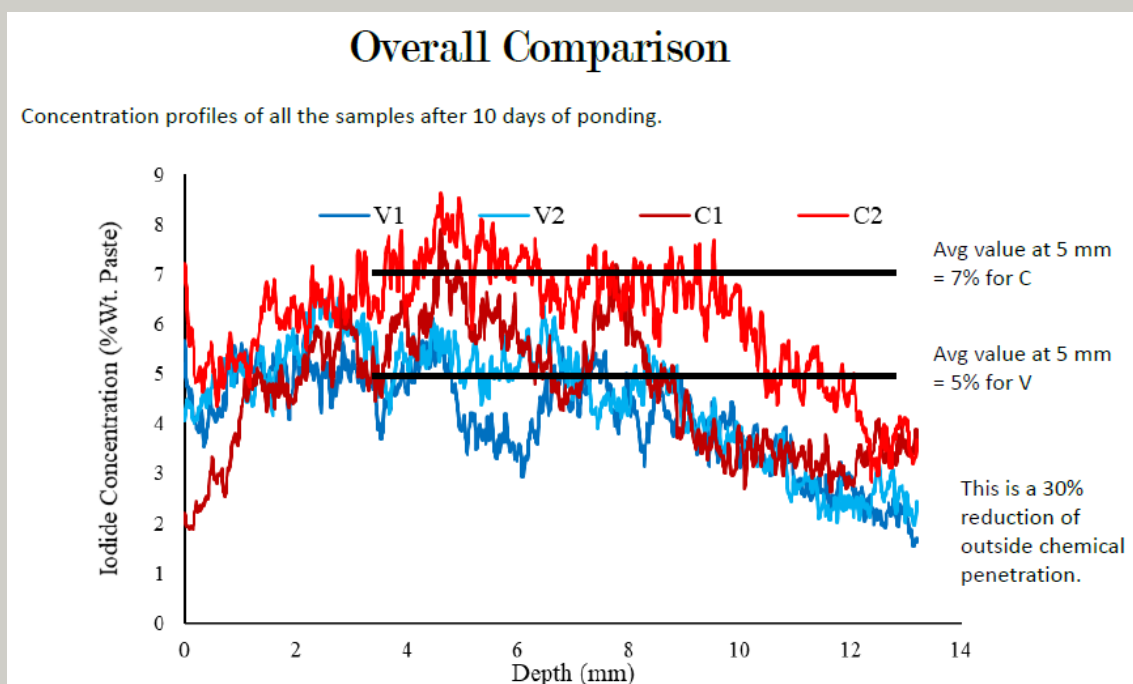
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| | MasterFormat Involving Vapor Lock - |
| | 03 00 00 Concrete - |
| | 03 30 00 Cast-in-Place Concrete |
| | 03 31 00 Structural Concrete |
| | 03 37 00 Specialty Placed Concrete/Shotcrete |
| | 03 38 00 Post-Tensioned Concrete |
| | 03 40 00 Precast Concrete |
| | 03 50 00 Cast Decks and Underlayment |
| | 03 70 00 Mass Concrete |
| | 31 30 00 Earthwork Methods - |
| | 31 32 33 Shotcrete Soil Slope Stabilization |
| | 31 32 36 Soil Nailing |

Below are summaries of the most up-to-date Corrosion Potential testing available and are the product of hundreds of hours in C09 Concrete & Aggregates, D08 Waterproofing and G01 Corrosion of Steel ASTM technical committees. Combined with ASCE, ACI and Rilem technical committees and published papers offer the most real-world, practical testing to illustrate steel in concrete *Corrosion Inhibition* available.

First, our core technology lies in providing a completely disrupted capillary system; *focusing on where there is no concrete*. Our goal, drastically slowing the **Initiation** of steel corrosion in concrete; massive reductions in the ingress/egress of deleterious materials entering the cement matrix; chlorides, sulfates, microbial, etc.. A disrupted capillary system

(capillary break), reducing porosity down around the 0.02 US Perm level. Modified ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete as proposed by Dr. Tyler Ley, Ph.D., P.E., at Oklahoma State University - X-Ray Penetration with Iodide to best illustrate this.

In this protocol, two small 1" deep by 1" in circumference cores are prepared with wax around the sides. Potassium iodide is added and two x-rays from two different angles are taken immediately, and then at days 1, 5, and 10. Potassium iodide is used as it shows up better in X-Rays and diffuses in concrete very similar to that of chloride ions.



Conclusions

- The Vapor Lock enhanced concrete versus the control showed a **30% reduction** in surface/shallow penetration with potassium iodide at 10 days of exposure.
- Similar results were found at 5 days and both cores showed good agreement with each other for samples C and V.
- The results were tested at day 75 - 85, with relatively high-performance mixes.

Next, we provide a benign, **Electro-Chemical, migrating film coating** in our admixture. This robust, self-healing film coating moves towards any ferrous material while the concrete is in its 'plastic stage'. Reinforcement (steel bars, p/t cables, etc.) are all automatically protected and the corrosion process is forever inhibited.

To best illustrate this process, we've adopted modified G109 or "Cracked Beam" tests (AASHTO T259); where we try to induce as much corrosion as fast as possible. Saturated salt solutions in direct contact with crack induced beams that are ponding; dried, and

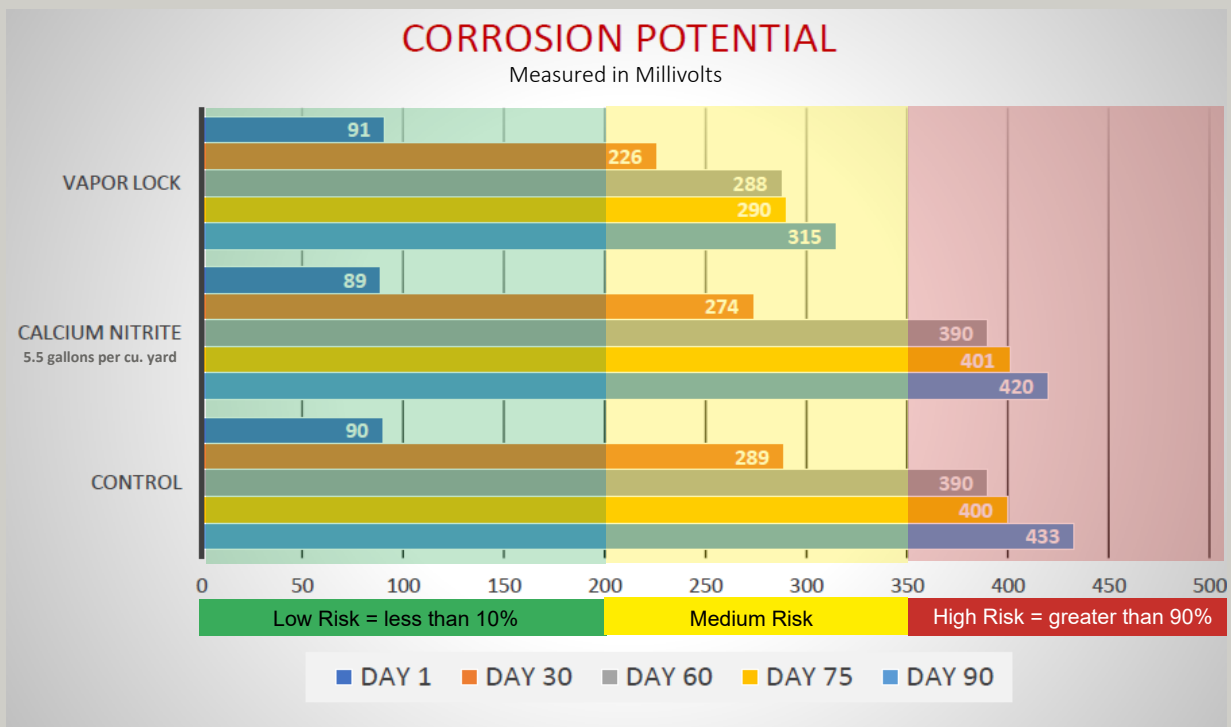
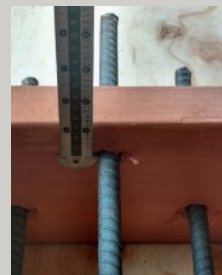
re-wet often. Besides the ultimate physical inspection of the rebar that takes place at the conclusion of the wetting/drying cycles, we've incorporated a Half-Cell (ASTM C876 - Standard Test Method for Half-Cell Potentials of Uncoated Reinforcing Steel in Concrete) to aid in predicting corrosion activity as it takes place.

Our goal, drastically slowing the **Propagation** of steel corrosion in concrete, if and when it happens. The highly disrupted capillary system and active film coating is both cathodic and anodic activity and considered active protection.

Specimens made from a common 4,500 psi, 0.45 w/cm ratio, 1" top size aggregates mix with 658 pounds of cement. Three number 4 bars (1/2" diameter) placed in a standing triangle pattern, with the top bar being 1" from the surface. Steel was purchased from a standard building material center and not cleaned or treated in any way. The modified "crack beam" tests are finalized by a subjective, destructive physical inspection of the rebar. Up to that point, we incorporate ASTM C876 with a Half-Cell to 'map' corrosion potential. The results are summarized below:

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Conclusions - By Day 60, both the control and calcium nitrite specimens were well into the 'High Risk' zone of Corrosion Potential. Vapor Lock enhanced concrete is holding in the Neutral zone of Corrosion Potential.

Vapor Lock™ 40/40

Product Uses, continued -

Vapor Lock 40/40 is effective in all structural concrete applications and is designed for substantial protection in "Post Crack" conditions. It is equally effective in horizontal slabs and vertical walls. In restrained concrete, reinforcement congestion is not an issue, as the protective film/coating is an electro-chemical process - it goes where the concrete goes. **Vapor Lock 40/40 enhanced concrete can be used in lieu of traditional waterproofing membranes and coatings, as a 'Belt-and-Suspender' approach when extra protection is needed, and in conjunction with the **Elastomer Disruptive System (EDS)** in order to obtain the 10-Year Warranty and Insurance.**

The EDS is an extra component, and may be required in higher risk applications to obtain the 10-Year Warranty and Insurance package.

Finishability

The rheology of Vapor Lock enhanced concrete is increased with additional fines and an absence of bleed water (after screeding and floating). Most mixes experience about a 1/2 inch increase in slump and a noticeable increase in paste. This allows for a superior finish; either a rough broom or hard troweled finish with tighter surface tolerances.

Packaging & Handling

Vapor Lock is sold and supplied only through commercial ready mix producers and licensed pre-cast facilities. It is measured and added under the direction of only state licensed readymix weighmasters. It comes in 275 & 330 gallons standard IBC totes and 55-gallon drums. It has a one year shelf life and should *not* be allowed to freeze.

Addition Rates & Dispensing

Vapor Lock is dosed based on off cementitious material - 10 ounces per hundred weight. *Both cement and supplemental materials (fly ash, slag, etc.) should be taken into account.* This dosage serves mixes 0.42 thru 0.52 w/cm ratios. Mixes outside of this range, will require modification. Vapor Lock should be added with the majority of head waters. Either portable dosing units or permanent, high-volume, automatic dosing systems wired directly into the batching panel are available and recommended.

Compatibility with Other Admixtures

Vapor Lock can be used with a full array of other types and other manufacturers of admixtures - with the exception of another Shrinkage Reducing Admixture with which DELAMINATION WILL OCCUR. Other admixtures should be kept separate from Vapor Lock and added under their own directions. Vapor Lock can be used with air entrained mixes.

The Vapor Lock admixture shall be considered part of the total water in the mix design. The admixture shall be delivered as a ready-to-use liquid product and shall require no mixing at the batching plant or job site. In regards to actual mix performance, pre-testing is recommended. Please consult your SPG/Vapor Lock representative for guidance. Vapor Lock is a non chloride containing, non-corrosive admixture that will not initiate or contribute to the corrosion of reinforcing steel. Vapor Lock is a registered trademark of Specialty Products Group. All 3rd party and in-house testing is available in it's entirety by email below.

Specialty Products Group - 877.957.4626 - sales@spgGoGreen.com

USA - 3909 Witmer Rd, Niagara Falls, NY 14305

Canada - 6254 Skyway Road, PO Box 915, Smithville, ON L0R 2A0

Pacific Region - Jim Kaylor, Technical Mgr., 310.650.4263, jkaylor@spgGoGreen.com